U. S. Department of Agriculture
Forest Service

Pacific Northwest Forest
and Range Experiment Station

Research Paper PNW-261
October 1979

Poisoning and Trapping Pocket Gophers to protect Conifers in Northeastern Oregon

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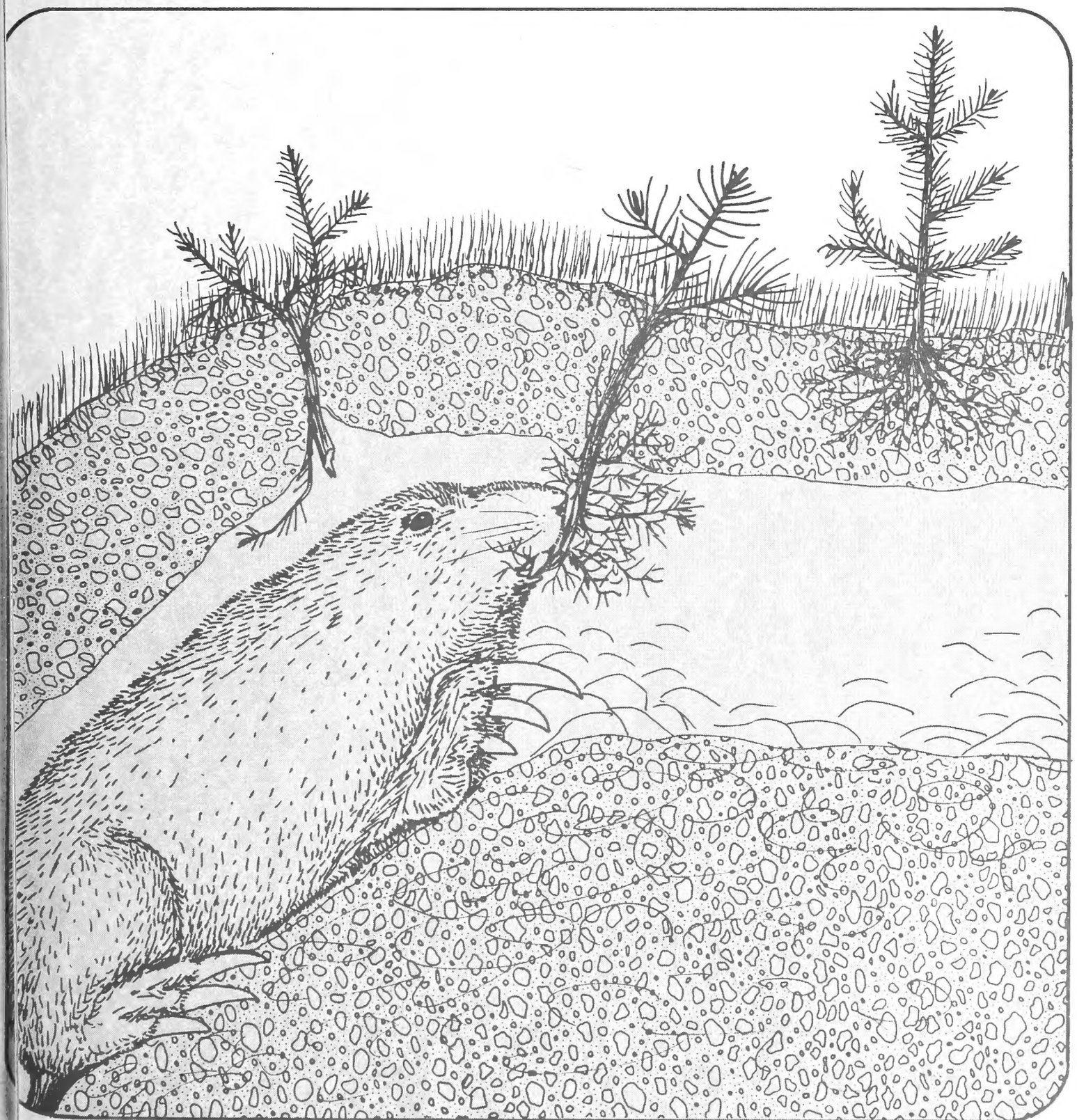

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Poisoning and Trapping Pocket Gophers To Protect Conifers in Northeastern Oregon

Reference Abstract

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1979. Poisoning and trapping pocket gophers to protect conifers in northeastern Oregon. USDA For. Serv. Res. Pap. PNW-261, 8 p. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Poisoning or trapping pocket gophers was employed on mixed conifer plantations in northeastern Oregon to reduce the rodent's damage to young trees. Single treatment of either procedure was ineffective, but two applications, about 2 weeks apart, resulted in significant reductions in mound building and damage to trees.

KEYWORDS: Poisoning (-animal pests, trapping (-forest pest control, gophers (pocket), rodent control.

RESEARCH SUMMARY

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For many years, pocket gophers (*Thomomys* sp.) have been known to kill planted and natural conifer seedlings and saplings on clearcut blocks in the Blue Mountains in northeastern Oregon. Foresters there have reported annual tree losses caused by gophers in single species and mixed plantations. Although accurate assessments are not available, losses have been judged severe enough to warrant periodic programs of poisoning or trapping to reduce numbers of gophers, thereby controlling damage to the trees.

Unfortunately, the efficacy of such treatments to protect trees has not been evaluated adequately in the Blue Mountains or on other Western forests where similar practices of control are employed. This 2-year study was conducted to determine whether the established operational poisoning and trapping program used on the local National Forest protected young conifers and whether trapping was as effective as poisoning.

The first year, poisoning and trapping were conducted by Forest Service crews according to procedures regularly followed with no preferential treatment of study sites. Clearcut blocks were treated once during the summer, with the time of application regulated by the crew supervisor. This procedure proved ineffective and was modified the following year when blocks were treated twice, with 2 weeks or more between treatments.

The single treatments of poisoning or trapping applied the first year did not reduce tree damaghe or mortality from gophers, but either treatment applied twice the following year resulted in a significant reduction in both damage and mortality from these animals.

Annual losses from gophers in the Blue Mountains appeared lower than those we have observed elsewhere in the Pacific Northwest. But even these rates of attrition, if uncontrolled, could eventually eliminate planted trees and delay restocking unless the sites are periodically replanted or naturally regenerated.

Trapping was more expensive than poisoning in hours expended, and even though traps can be used repeatedly, their initial high cost compared with that of poisoned bait seems to further justify poisoning as the more economical procedure.

Contents

For many years, pocket gophers (*Thomomys* sp.) have been known to kill planted and natural conifer seedlings and saplings on clearcut blocks in the Blue Mountains in northeastern Oregon.

Gophers are widely distributed in this area. Even cursory examinations of most natural openings or clearcut blocks will reveal mounds of earth from gopher excavations, or ribbons of soil (casts) pushed into the snow by gophers in winter. Abundance of mounds or casts is generally considered an indication of gopher abundance.

Ranger Districts on the Umatilla National Forest, Oregon, have reported annual tree losses caused by gophers in single species and mixed plantings of ponderosa pine (*Pinus ponderosa*), grand fir (*Abies grandis*), western larch (*Larix occidentalis*), lodgepole pine (*P. contorta*), and Engelmann spruce (*Picea engelmannii*) (Crouch 1969). Although accurate assessments are not available, losses have been judged severe enough to warrant periodic poisoning or trapping programs to reduce number of gophers, thereby controlling damage to the trees.

Unfortunately, the efficacy of such treatments to protect trees has not been evaluated adequately in the Blue Mountains or on other Western forests where similar control practices are employed. Increasing demand for prompt reforestation after logging and burning plus mounting concern about benefits and costs of programs to control damage by animals requires appraisal of current gopher control procedures. Also, apprehension about control methods using toxicants justifies comparative evaluation to determine if trapping is an acceptable alternative to poisoning.

Our study was conducted to determine whether the established operational poisoning and trapping programs used on the Umatilla National Forest protected young conifers from gophers and whether trapping was as effective as poisoning.

Study Area and Methods

The study area was located on the Walla Walla Ranger District of the Umatilla National Forest at elevations ranging from 4,500 to 5,000 feet. Plant communities and soil characteristics of this mixed conifer forest were described by Hall (1973).

Four replications of three clearcut blocks each were selected on the western part of the Ranger District. A replication consisted of blocks of similar size, slope, year of logging, tree stocking levels, and current gopher activity levels. The 3 blocks within replications averaged 14, 20, 25, and 40 acres among the 4 areas.

TREATMENTS

In 1973, one clearcut block in each replication was randomly assigned for poisoning, trapping, or to be left untreated. In 1974, the same treatments were again randomized among blocks, without regard to assignments the previous year. Poisoning and trapping were conducted by a Forest Service crew that routinely did this work. The crew consisted of four or five seasonal employees with the junior author serving as field supervisor; they generally worked from snowmelt in June to snowfall in October.

In 1973, poisoning and trapping were conducted according to procedures regularly followed on the Ranger District with no preferential treatment of study sites. Traps were set or poisoned bait (a spoonful of strychnine-treated,[1/] steam-crushed oats) was placed in an open tunnel of a gopher's main burrow system. Area treatment was accomplished by spacing crew members about 50 feet apart along one side of a block and having them move across the area, setting traps or dispensing bait where freshly built gopher mounds were encountered.

Blocks were treated once in 1973, with the time of application regulated by the crew supervisor. In 1974, blocks were either trapped or poisoned twice, with 2 weeks or more between treatments. The more intensive treatment in 1974 was devised after the procedure used the previous year proved ineffective.

EVALUATION

Control measures were evaluated by comparing among treatments the percentages (frequencies) of plots occupied by casts or mounds produced by gophers, and percentages of damage to stems or roots and mortality of trees. Sample data were obtained from 0.01-acre circular plots systematically established 1 per acre at 210-foot intervals on parallel compass lines beginning about 100 feet from uncut timber and extending across the blocks. Plot centers were marked with numbered wooden stakes, and the four trees nearest plot centers were also staked.

In 1973, plots were installed and existing mounds counted and erased in mid-August. Treatments were applied at three of the four locations by early September, and plots and trees were reinventoried about 2 weeks later. The fourth area was not treated until October; these blocks were not included in the 1973-74 analysis.

[1/] The pesticide reported on here was registered for the use described at the time this publication was prepared. Since the registration of pesticides is under constant review by State and Federal authorities, a responsible State agency should be consulted as to the current status of this pesticide.

In 1974, blocks were inspected in early July soon after snowmelt, and treatments were assigned. They were examined again in mid-September, about 2 weeks after the final treatments were applied, and finally in June 1975.

DATA ANALYSES

Data were subjected to analyses of variance with arcsin transformations of percentage values. Tukey's test was used to separate treatment means where appropriate (Snedecor 1961).

Results

GOPHER ACTIVITY

Pretreatment cast frequencies in May 1973 and mount frequencies in August were nearly identical (table 1). Mound frequencies in

Table 1--Pocket gopher activity before and after poisoning or trapping on clearcut blocks in the Blue Mountains in Oregon

Activity indicator[1]	Treatment[2]					
	1973-74			1974-75		
	None	Poison	Trap	None	Poison	Trap
	--Percent of 0.01-acre plots occupied--					
Before treatment:						
Casts, May[3]	44	44	44	55	58	61
Mounds, August	74	77	77	--	--	--
After treatment:						
Mounds, September	56	50	46	66a	34b	41b
Casts, June	61	58	53	65	57	56

[1]Means within the same activity indicator and year class followed by the same letter or no letter are not significantly different (P = 0.05).

[2]Blocks were poisoned or trapped once in 1973 and twice in 1974.

[3]Cast counts in 1973-74 were made prior to the start of this study.

September, after poisoning or trapping, were also similar, indicating that the treatments did not reduce gopher activity. In 1974, pretreatment cast frequencies were somewhat greater than in 1973, but again were nearly identical among blocks within each group (table 1). After two poisoning or trapping treatments in July and August, mound frequencies were significantly lower on the treated areas than on the controls. But again, cast frequencies were not different among treatments the next spring (1975) indicating that treated areas had been reoccupied.

DAMAGE AND MORTALITY

Despite high pretreatment levels of gopher activity on all blocks, damage to trees was low compared to other areas in Oregon (Crouch 1971, Hooven 1971, Barnes 1974) (table 2). Virtually all damage occurred in winter, and it was similar to that found elsewhere by the senior author. Some small trees were removed by gophers, some were cut off at ground level and their tops were removed, and roots were severed and removed from others. Larger trees were usually barked, with root damage also evident.

Table 2--Damage and mortality to conifers from pocket gophers on poisoned or trapped clearcut blocks in the Blue Mountains in Oregon

Item[1/]	Treatment[2/]					
	1973-74			1974-75		
	None	Poison	Trap	None	Poison	Trap
Trees per acre, number	246	270	250	236	246	225
Tree height, cm	49	44	47	59	58	62
Damage by gophers, %	7	5	7	12a	3b	4b
Mortality from gophers, %	5	3	3	9a	3b	3b
Total mortality, %	8	9	8	13	8	9

[1/]Means within the same item and year followed by the same letter or no letter are not significantly different (P = 0.05).

[2/]Blocks were poisoned or trapped once in 1973 and twice in 1974.

The single poisoning or trapping treatments applied in 1973 did not reduce damage or mortality from gophers (table 2). But this lack of control was expected because mound frequencies, our indicators of gopher abundance, had not been reduced by the treatments (table 1). Poisoning or trapping twice, 2 weeks apart in 1974, reduced mound frequencies about 50 percent and resulted in a significant reduction in damage and mortality caused by gophers.

On untreated blocks, gophers were the major single cause of mortality in both years, but they were not the most important factor on treated areas in either year (table 2).

Gophers showed no apparent preferences among the six species of conifers comprising the sample trees (table 3). Smaller trees were damaged more often than larger ones, and losses were greatest among western larch seedlings interplanted in 1972 on blocks at two of the study sites.

Table 3--Damage to conifers by pocket gophers on clearcut blocks in the Blue Mountains in Oregon

Species	Number of trees	Percent damaged
True fir (grand and subalpine firs)	390	5
Western larch	294	9
Ponderosa pine	103	8
Engelmann spruce	88	4
Lodgepole pine	71	4
Douglas-fir	22	5

Discussion

Poisoning or trapping twice in a single year significantly reduced losses from gophers, even though overall damage was relatively low. We cannot, however, predict whether the percentage reduction in gopher activity we attained would result in areas where initial mortality from gophers was greater.

Mound frequencies based on counts made 2 to 4 weeks after poisoning or trapping provided satisfactory predictions of treatment effects. Lack of significant reductions in mound frequencies after treatments in 1973 correctly predicted that no reductions in gopher damage or mortality would occur during the next winter. Significant reductions in mound frequencies after treatments in 1974 were followed by reductions in damage and mortality measured in June 1975. Although no evaluations were subsequently made, the high cast frequencies in June 1975 may have indicated that reductions in tree mortality were temporary, and that continued treatment might have been needed to maintain control of gopher populations and reduce tree losses.

Trapping was more expensive than poisoning in hours expended (table 4), and even though traps can be used repeatedly, their initial high cost compared with that of poisoned bait seems to further justify poisoning as the more economical procedure.

Table 4--Time expended poisoning or trapping pocket gophers on clearcut blocks in the Blue Mountains in Oregon

Year	Treatment[1]	
	Poison	Trap
	----Worker-hours per acre[2]----	
1973	1.4a	2.0a
1974	1.4a	3.0b

[1] Treatments applied once in 1973 and twice, about 2 weeks apart, in 1974.

[2] Within years, means followed by the same letters are not significantly different (P = 0.05).

Certainly the application of poisoned grain, even underground, constitutes some hazard to nontarget animals and therefore may be undesirable in some instances. But gopher traps also present hazards. We have caught weasels (*Mustela* spp.), deer mice (*Peromyscus maniculatus*), chipmunks (*Eutamius* spp.) and kangaroo rats (*Dipodomys* sp.) in them.

Time expended in application of either treatment is only one measure of cost. Expenses also must include those that pay for surveys to determine where control is needed, transportation and housing of workers, and materials to protect workers handling poisoned bait.

Annual losses from gophers in the Blue Mountains appear lower than those we have observed elsewhere in the Pacific Northwest. But even these rates of attrition could eventually eliminate planted trees and delay restocking unless the sites are replanted or naturally regenerated.

Foresters experiencing slow losses of trees from gophers face difficult decisions regarding control programs. Judgments must be made on whether observed losses will materially deter or preclude reforestation, or if survival of plantings plus natural recruitment will adequately restock clearcut blocks within prescribed time limits. Such judgments require annual monitoring of plantations and decisions to control losses before stocking approaches minimum acceptable levels. To delay control will often result in need for replanting, including costly site preparation procedures.

Our results indicate that trapping can substitute for poisoning to control damage by gophers although trapping appears to be more expensive and no more effective than poisoning.

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